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**ESTUDI I ANÀLISI COMPARATIU ENTRE BASES DE PREUS DE LA
CONSTRUCCIÓ: CAPÍTOL D'ENDERROCS I MOVIMENT DE TERRES**

ASSOLIMENT DE LA TERCERA LLENGUA EUROPEA OFICIAL (ANGLÈS)

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NUCLEUS OF THE REPORT

1 PREVIOUS CONCEPTS

1.1 BASE OF PRICES

A database is a compilation of data belonging to the same context and neatly stored for later use.

The base of prices is a specific type of database, and includes construction items described and measured with more or less complementary information. A construction item (also called “unit price” or “unit of work”) is a construction made by a group of specialists, and it is a way to divide a project into smaller pieces, and subsequently it will be grouped into sections, sub chapters and chapters depending on the relation according to different criteria such as execution time or the type of workers that make it up, to form the most general group: the complete project.

The first chart or base of prices appeared in Spain was the book “Cuadros de precios” published by the Instituto Eduardo Torroja from 1969 until 1979, which became the base of reference during the 70s in the twentieth century.

Alternatively, there were some compilations of prices of materials (like “Construct” or “EME-DOS”) that were published regularly, jointly with other books containing descriptions and decompositions of work units without rating. The function of establishing the prices of labor and, ultimately, the prices of the work units, was deposited on the designer.

The construction items of the Instituto Eduardo Torroja’s book were numbered in correlative order and therefore we could not refer to them by number, because it could change from one edition to another. Neither was common at that time to include the decomposition of the items in the estimating, except those used in official works.

At this time the NTE (Technological Standards of Buildings) also appeared, and they pretend to systematize the knowledge of the construction world, classifying products and units of work and collecting very detailed specifications and drawings. But the NTE didn’t pretend to provide information about the prices. In fact, their decompositions were not referred to labor or machinery. This, in addition to the NTE were considered too advanced for the sector because the proposed solutions were far from common practice, and they were not mandatory, led to his usual role was to be a textbook for designers instead of being a direct reference for the projects.

With the end of the publication of the Instituto Eduardo Torroja’s base of prices, there was a large gap in the emergence of new bases of prices. In 1980, furthermore, the first Spanish program for estimating with personal computers –Presto- appeared. Despite of the need of prices charts was common for designers who used computer tools and those who did not use them, the first were benefited by the existence of abundant, storable and sortable by a computer information.

In 1983 the “Banc estadístic de costos de la construcció” (Statistical base of construction costs) was published, written by Sergio Pasarín Rua. It acquired a significant importance for several years, mainly in Catalonia.

The first modern chart of prices did not appear until 1984. It was published by ITeC (Catalonia’s Construction Technology Institute). It sought to be a part of a much more complex system than a simple list of work units, within an idealized integrated complete model of the construction process. The structure of the base -in concepts and chapters-

received a very important attention. Also the encoding of the items acquired a strong role. Faced to the identification of items by its order or position in the list of prices base -as in Eduardo Torroja's prices chart- the practice to assign a fixed alphanumeric code for each unit of work proved to be more useful. This code could be used as a reference in the development of an estimating, facilitating the crossed relationship between different documents of a project. Also, it could be used for fixing what specific price were they talking about in the relations between various actors of the construction -because the price did not change although the items were moved to a different chapter or differently sorted. Using a standard coding also allowed to take advantage of various automatic functions of the estimating software, like selective price updates, information searches or comparisons.

The ITeC's base of prices prioritized descriptions of units of work ahead for the accuracy of prices, because since its main target was to improve the quality of the process of project and execution. There were a lot of arguments provided: it improved the quality of each element of the project enhancing their specifications; it simplified the designer's job due to the use of reliable external references; it made the offers' development and comparison easier, even the building execution because projects were more standardized; and it served as a factual reference in conflicts, errors in specification or contradictory prices.

Another objective intended by the creation of this base of prices was making the regulatory capacity of Catalonia strong in the field of construction, providing an official reference. It was a part of the strategy of normalization of the Catalan language.

Then, some Catalan official institutions demanded the use of ITeC's prices chart in the works under his care, including the coding, the descriptions, and even sometimes the same prices.

In 1986 the first printed edition of the base of prices of the COAAT Guadalajara (Architects and quantity surveyors' association of Guadalajara) appeared, with different objectives than the ITeC's base of prices. It explicitly sought providing the market with reasonable prices, it hardly enjoyed official support, it made low mention about the integrity of the building process and it did not use the coding or classification of items. In fact, this base of prices intended to reflect the reality of the sector rather than changing it.

This base quickly became popular among designers for its ease of use and understanding, and for not being strictly linked to any organization or geographic area. This reason converted the base to a so much objective and independent reference base.

At the middle of the eighties, there was a flood of appearance of bases of prices caused by many associations of architects and quantity surveyors, municipalities and autonomous regions, who wanted to have their own bases of prices, due to competition among agencies, while seeking to play a role in the control of the construction sector. Another objective of the autonomous communities was to hinder the entry of professionals and construction companies from other areas. Sometimes, the developer (being an agency depending on the state, an autonomous region, a municipality or a company) imposed the use of a particular base of prices.

Most of the bases emerged after the ITeC's base were characterized by the attempt -always from the perspective of the creators of the base- to establish the correct way to perform decompositions, to include the real prices of each element, to improve the deficiencies of the other bases, and to show themselves independent from the editors or sponsors of other bases.

Some of the main drafters of bases have been: COAAT of Cantabria, COAAT Guadalajara, COAAT La Rioja, COAAT Malaga, COA of Baleares, COA of Murcia, Comunidad Autónoma de Madrid (Dirección General de Arquitectura), Edicones Compas (Construc) Fundación

CIEC (Canarias), Fundación Codificación y Banco de precios de la Construcción (Andalucía), Fundación para estudios sobre Calidad de Edificación (Asturias), Gobierno de Aragón - Dirección General de Arquitectura (BDCA), Gobierno Vasco (Dirección Arquitectura), Institut de Tecnologia de la Construcció de Catalunya (ITeC), Institut Valencià de l'Edificació (IVE), Instituto de la Construcción de Castilla y León (BPCCL), Instituto Tecnológico de Galicia (ITG), Junta de Extremadura (BPCJEX), MFG Ediciones (EME DOS Agenda de la Construcción), Predeco, and ATAYO S.A.

There are also bases of prices specialised in specific sectors, for example written by: Dehesa de la Jara SL (about parks and Gardens), FAVI (about plumbing and heating installation), FENIE (electrical installation), Fundación Prom. Ingeniería Agronómica (Agricultural and forestry construction), Instituto Tecnológico de Canarias - ITC (Industrial installations), Oficina Nal. de información sobre viveros y plantas (ONIVP), Programación Integral (BASELEC, electrical installations), and many other bases like the agroforestry, the solar thermal energy or the photovoltaic energy ones.

Nowadays, the vast majority of bases of prices are made for computers: sometimes as the single format, and others, as a complement to a printed edition. In order to those programs could recognise the data provided by the bases of price, there have existed several methods.

With the advent of computerized bases of prices, some creators linked their base more or less strictly to specific software, creating the base of prices in the internal language of this, to prevent the base could be used by software from other editors. Others, however, used a public language for their bases, but differentiated from other companies' ones.

This situation forced every program to have specific import mechanisms to each format. The editors followed this way of action for a while, although it represented a big effort because there were a lot of different bases of prices, with its specific format, varying even between different editions of each base. In addition, formats were changed without notice, and did not have an adequate documentation to facilitate the creation of import mechanisms.

Around 1988, the leading estimating software companies and the editors of bases of prices - represented in the Fundación Codificación y Banco de Precios de la Construcción (FCBP)-, the Institut Valencià de l'Edificació (IVE), the Gabinete Técnico de Publicaciones of COAAT of Guadalajara, the Dirección General de Arquitectura de la Consejería de Política Territorial de la Comunidad de Madrid (CAM) and the Institut de Tecnologia de la Construcció de Catalunya (ITeC) agreed to design an interchange format to standardize the language of the bases and software of the building sector, so that each program may read data generated through other software. It was a format called FIS 1.

This format allowed the data to be read by other software, but not coordinating issues like the organization of the base or the estimating, the encoding or the language. This fact linked to errors of the base itself -as the inability to exchange takeoff- and the lack of knowledge about computers among a part of the people in the sector.

Although it continued working on the evolution of the FIS 1 format, in 1990 it reached its full possibilities. In addition, it was impossible to overcome the limitations previously described.

That same year, the CAM (Autonomous Community of Madrid), working parallel to the group that developed the FIS 1, presented its own interchange format. This was accepted to avoid the simultaneous existence of two formats, in exchange for the CAM to join its efforts with the group from that time. This new format was more advanced than the FIS 1 and was called Formato de Intercambio Estándar Base de Datos de la Construcción -Standard Exchange Format for the Construction Data Base (FIEBDC)-. The FIS 1 was not a repealed, but its use was removed from all the software because of their limitations.

Later, the FIEBDC evolved, integrating estimating, takeoff, graphs, specifications and official suppliers. Furthermore, many of its possibilities have not yet been used for the current bases of prices.

In 1996 it was decided to provide the FIEBDC maintenance meetings with more organization, establishing the FIEBDC Association, intended for that purpose.

The files with extension .BC3 -highly used nowadays- contain data in standard Spanish format FIEBDC-3.

The frequency of new bases of prices risen during the 90s decreased significantly, to the point of appearing only one base a year during the last five years of the millennium. In addition, several institutions began to order the edition of their bases of prices to authors of other bases. These developed an adapted version of their original one.

One reason for this decline in the appearance of new bases of prices was that several institutions noted that the advantages of having an own base did not compensate the costs required to maintain it. So many charts of prices ceased to be edited or their frequency of update was significantly reduced.

The emergence of bases of prices specialised in specific activities of the sector (such as installations, gardening and forestry activities), however, increased.

Currently, the main charts of prices used in the construction sector are:

- Centro. Edited by COAAT of Guadalajara
- The base called Generador de Precios from CYPE Ingenieros.
- The base provided by the magazine EME-DOS, which includes complete work units, such as rooms or entire houses.

In addition to other bases offered by public entities such as:

- Fundación Codificación y Base de Precios (Andalucía)
- Fundación de Estudios para la Calidad en la Edificación (Astúrias)
- Centro de Información y Economía de la Construcción (Canarias)
- Instituto de la Construcción de Castilla y León
- Institut de Tecnologia de la Construcció de Catalunya (ITeC)
- Junta de Extremadura
- Instituto Tecnológico de Galicia (ITG)
- C.O.A.A.T. de La Rioja
- Comunidad de Madrid, Departamento de Publicaciones
- Ayuntamiento de Madrid, Gerencia de Urbanismo
- Gobierno Vasco
- Institut Valencià de l'Edificació (IVE)

According to Gonzalo Garcia Muñoz, professor of the School of Architecture at the European University of Madrid^[1], the structure of content of the bases of prices remained almost unchanged since 1995. It seemed that the parametric charts would replace traditional ones, but now the two types coexist, although the traditional charts have more dissemination. Major problems -semantic and coding differences between different charts- still remain and there are not significant improvements in the search of a solution.

¹ <http://www.presto.es/pages/documentos/articulos/CUADROSPRECIOS.HTM>

In the opinion of the author, in the future, the bases of prices will continue concentrating among them, with less independent authors left. New authors of bases with general purpose, specialised in specific aspects of content –as prices reliability, more structured decompositions or the inclusion of the health and safety studies' requirements- may appear. Also, it could happen that these improvements would be incorporated to the base of any current author.

Specialised charts, knowing the subsectors they serve, will continue appearing.

Regarding CYPE –we are going to use their base of prices in this work-, in 1983 the CYPE Ingenieros SA (an engineers' company about structure' pathology and calculation –standing for Cálculo Y Patología de Estructuras-) appeared, with the aim of developing all types of engineering and computer projects.

In the middle of the year 1998, given the specific location of engineering projects, the company split its field of action creating CYPE Ingenieros Estudios y Proyectos SA, a company responsible of these projects from this moment. CYPE Engineers became devoted to the development, marketing and distribution of technical software for the sectors of architecture, engineering and construction. In 2006 both companies were completely dissociated. Currently, the branch in charge of engineering projects has even discarded the name CYPE in its designation.

Since 1990, CYPE Ingenieros has been carrying out a major worldwide expansion.

1.2 TYPES OF BASES OF PRICES

The traditional bases of prices rules are an extensive list of work items placed under specific classification and hierarchy established by their editors.

Due to the fact that many work items come from small variations of other ones, there is another type of bases, the parametric ones, which allowed to choose the desired value for each of the proposed parameters, finally producing a specific item, instead of showing all the possibilities of a family of work items. The software using this method is edited so as to avoid selecting impossible combinations. In addition, the parameterization was very useful for storing information at the beginning of parametric bases in digital format, in which time the memory of computers was much less than usual it is today.

For example, in the case of the front of a building, a software that works with parametric prices will generate a work item (including price, description, and the decomposition by elements) based on the choice made by the user of different types of inner and outer wall, the thickness of each layer or used materials, among other things.

Therefore, parametric prices have several advantages: they facilitate the selection of the suitable work item, such as the number of them is reduced due to the setting of parameters; they help users make decisions because they do not allow incorrect combinations; and they include more variety of items than nonparametric bases of prices.

The first person who used the parametric prices was Professor Pedro Maria Rubio Requena of the High School of Architecture of Madrid, who in 1972 published the "Fichas para redactar las especificaciones y valoraciones en urbanización y edificación" -Sheets for writing specifications and reviews in urbanization and building-, in the shape of cardboard pieces. Later, the idea took shape in a Dutchman software called Ibis-Calc. Finally, Ignacio Paricio spread the procedure in Spain.

The feature that characterizes the compatibility between the parametric prices of different bases is syntax, which is the set of computer rules and procedures followed to produce prices with a particular programming language.

The FIEBDC association developed a very accessible syntax caused by its simplicity and the fact of making it public so that any user could modify the rules as long as they have the necessary technical capacity. Several writers based syntax of their parametric bases in the previous bases, such as in the Valencia Institute of Building's one.

The system of the FIEBDC association admitted a maximum of four parameters, with twenty six possible answers for each one (one for each letter of the alphabet), without allowing free answers. The resulting code for each combination became unique, thus achieving the goal of attaching a unique code to each price.

The association itself developed later "compiled" parametric prices, with more complex and then inaccessible unalterable syntax. In return, it did not put limits on the number of parameters nor the possible answers to each one. With this new system, the same code could represent work units with different features and prices.

There is also the possibility that a software has a parametric prices system with a unique own design, but with exportable to other programs work units. This let adding to each item, as well as decomposition, description and price, other information such as technical calculations, trademarks or verification of compliance with applicable regulations.

Currently, there are basically three types of parametric bases:

- The standard format and public syntax ones. They are developed by the editors of the base of prices of the Valencia Institute of Building (as the base of the own Institute and the Community of Madrid's ones) or based on it, as the base of prices of the Instituto Tecnológico de Galicia (ITG) - Galician Institute of Technology- or the construction base of prices of Castilla y León.
- The ones that have standard formats and private syntax, as the ITeC's base of prices.
- The own design ones. They are mainly those of private companies as Presto or CYPE Ingenieros.

There exist bases of prices that in addition to choosing specific parameters of each item or unit of work, they can set specific characteristics of the work, such as accessibility of the site, its geometry or the number of floors. These parametric bases are called multiparametric, such as the CYPE Ingenieros' "Generador de Precios" –Prices Generator-.

1.3 CLASSIFICATION AND HIERARCHY OF WORK ITEMS

Most of the bases of prices follow the classification system published by the FCBP (Fundación Codificación y Base de Precios –Coding and Base of Prices Foundation-) on books "Clasificación Sistemática" and "Precios 2002". In the words of Antonio Ramírez de Arellano, a member of the now defunct FCBP, this classification was to "a tree and hierarchical structure in which each element is connected with upper and lower levels, through a network of relationships clearly identified, to ensure internal consistency of the system" [2].

The tree structure is a method which organizes information in a graphically represented hierarchy. It gets this name because its shape is similar to an inverted tree. The structure starts with one major node or root, and is subdivided into child nodes until the leaves (the last nodes, which do not generate new divisions). Each child node become from a single node or "father".

In the case of the construction bases of prices, from the main node arise the following levels: chapters, sub chapters, sections, groups of work items, and finally, the work item itself.

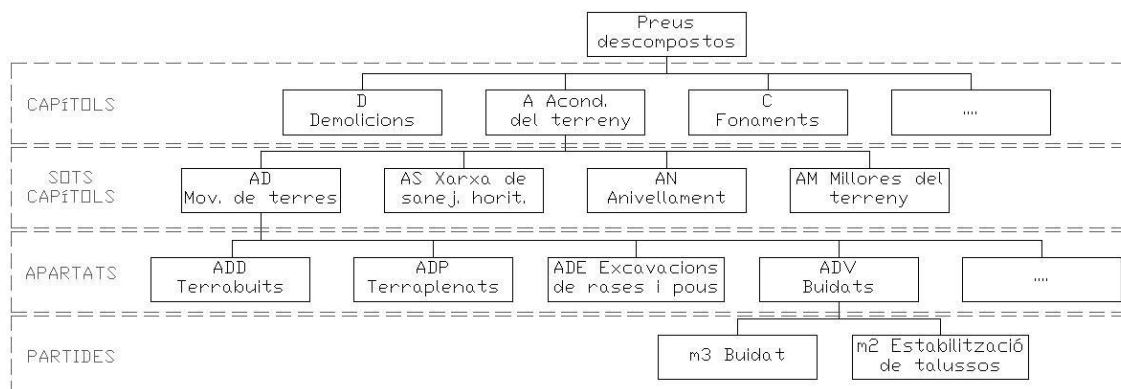


Figure 1.1: Example of tree structure

² http://coaat-se.es/revistaApa/lectura/numero_54/54_p62.html

We can appreciate this tree structure now in the Figure 1, and in the Figure 1.2 -which contains an example from the Prices Generator of CYPE Ingenieros.

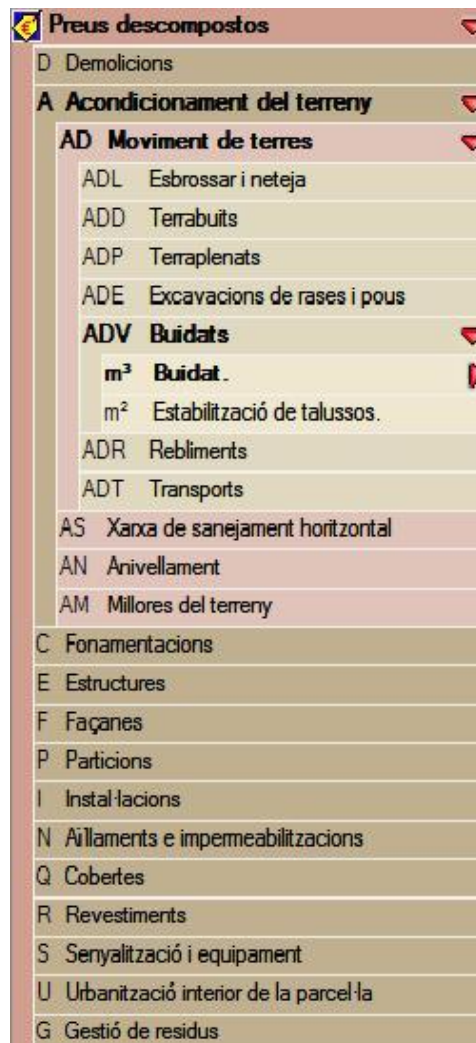


Figure 1.2: Screenshot of the example above applied to the generator prices CYPE Ingenieros

2 CHOOSSED BASES OF PRICES

2.1 INTRODUCTION

We have chosen two of the most popular bases of prices in the construction sector in Catalonia to do the comparison which is the purpose of this project: the BEDEC base (Structured Database of Construction Elements) from ITeC and the base of prices from CYPE Ingenieros.

We have used a particular version of both bases of prices:

- For ITeC's base, we have worked with the version offered on their website –which has free access- through the “metaBase”, which is a group of databases with information about construction products that provides information of prices, specifications, technical features, companies, certifications and environmental data, including the BEDEC base.
- Regarding the base of CYPE, we are going to work with the Prices of Construction's Generator software. It can be freely downloaded from its website, and it allows access to more choices of parameters than the accessible online version of the database.

2.2 ITeC

ITeC is an independent nonprofits company. It is a private foundation established in 1978, which exercises its activity in the field of actions whose perspective is the progress of building. It is governed and administered by a board consisting of a maximum of thirty members.

This board comprises representatives of the Generalitat of Catalonia, the universities, professional associations, several unions, the Chamber of Commerce and other business entities.

It is subjected to the legislation of the government of Catalonia, to private foundations' Act (Llei 1/1982 del 3 de Març del Parlament de Catalunya), the bylaws of the Foundation and other laws that are applicable to it.

ITeC focuses its activities in the following areas:

- The area of the construction process: it works on the creation of information, methodologies and tools (software), applicable on the execution and management of each phase of the construction process.
- The area of quality: it promotes, supports and evaluates the quality. Its activities include the establishment of insurance and quality management systems, and the evaluation and certification of companies and products in the field of construction.

The main areas of the Institute are:

- Sustainable Construction
- Materials and products for construction
- Technologies, systems and construction processes
- Assessment and management systems in construction
- Maintenance, assessment and rehabilitation of infrastructures and buildings

We should mention that ITeC is particularly interested in the lines of research dealing with items intended to join the building structures subsystems, such as decks or interior and exterior walls. It is also interested in redefining and research of new technologies, providing Institute's knowledge about these, particularly in designing new products and new systems to carry out work.

The ITeC has several databases:

- About legislation:
Legislation and regulations
- About products:
BEDEC base
Entities
Companies
Stores
Registration Materials
CE Marking
- About projects:
Projects' archive

BEDEC base

In our case we are going to use the BEDEC base (Structured Database of Construction Elements). It is a parametric base that contains 500,000 building, urbanization, civil engineering, restoration and rehabilitation, health and safety, control tests and indirect costs items, with reference prices for all provinces and autonomous regions, 5,000 technical specifications, the integration of commercial products from over 101 companies and environmental data. Its period is updated quarterly.

With the license of BEDEC, we can additionally have a computer version of the books of reference prices of all the elements of the base, 51 kinds of construction, urbanization and civil engineering estimates, 101 bases of prices of companies which manufacturer products of construction, and the bases of entities such as the following: Aigües del Ter Llobregat, Àrea Metropolitana de Barcelona, Forestal Catalana, Gisa, Imu, Incasol, Patrimoni Arquitectònic, Port de Barcelona and Regsa.

The BEDEC allows -acquiring the license- the possibility to export the work items in the FIEBDC format to be used in estimating software.

This is a parametric base, because it gives us predetermined conditions of work that can not be directly modified, but by applying coefficients to the prices depending on the volume of the work.

Among the other ITeC's databases, there are other bases of prices that were distinguished: the entities' ones (such as Aigües Ter Llobregat o l'Institut Municipal d'Urbanisme) and some companies' ones. The BEDEC is digital and editable as it is published in both paper and computer format.

2.3 CYPE Ingenieros

CYPE Ingenieros is a private architectural, engineering and construction company. He combines an intense activity in the field of engineering and structural calculations with the research in the field of computer development.

Among its most notable software include: urban infrastructures, installations of the building, predimensionator of takeoff and estimates, "Cypedoc: Libro del edificio" –about the building book-, "Cypedoc: Manual de uso i mantenimiento" –about use and maintenance of a building-, "Arquimedes y control de obra" –about calculation of structures and building control- and the Prices' Generator. One very positive point of CYPE is that it allows interconnection between their programs so the consistency and reliability of these is high.

These programs were updated regularly and effectively when new methods of work appear. In addition, CYPE develops a constant work of research because this software would be the most reliable and innovative as possible.

To give knowledge of their programs, the CYPE Company supports them through open access: it is the "After Hours Version" and "Evaluation Version", which are very useful for students so they help them to begin mastering these tools.

Sometimes CYPE participates in collaborative projects with organizations such as the Instituto Eduardo Torroja or the Scientific-Technical Association of Structural Concrete.

CYPE update their software working with builders, OCT and professional studios, or even through the suggestions of software users.

The CYPE's prices base is in the software "Generador de Precios" -Prices' Generator-, and it is included in other software of the company where it is necessary.

Archimedes and control of work

It is the tool that uses CYPE to perform takeoff, estimates, certificates, specifications and manuals of use and maintenance of the building. In addition, it serves to support the construction companies that implement financial control to know at all times the real costs that are current and expected for the end of the work. Software is updated according to changes in regulations.

It works with different bases of prices, with multiple prices (prices of labour, materials and equipment according to each province) and specifications (only if the base of prices it works with has these specifications). Software includes the CYPE's own base of prices, and the following:

- The 2004's construction base of prices of Ourense's COAAT
- The 2005's construction base of prices of the Junta de Extremadura.

The Arquimedes program allows the immediate updating of prices and performances from other bases of prices, other estimates, the Construction's Prices' Generator and the Rehabilitation's Prices' Generator.

It can adjust the estimate to the PEM and the PEC, and to the selected chapter or work item, and it has no limit for introducing chapters, sub chapters, decomposition lines or takeoff lines.

The main uses of Arquimedes program are estimating and takeoff. To make them as effective as possible, this program is organized through a database to manage all information correctly. This is structured as the way on the Figure 2.1.

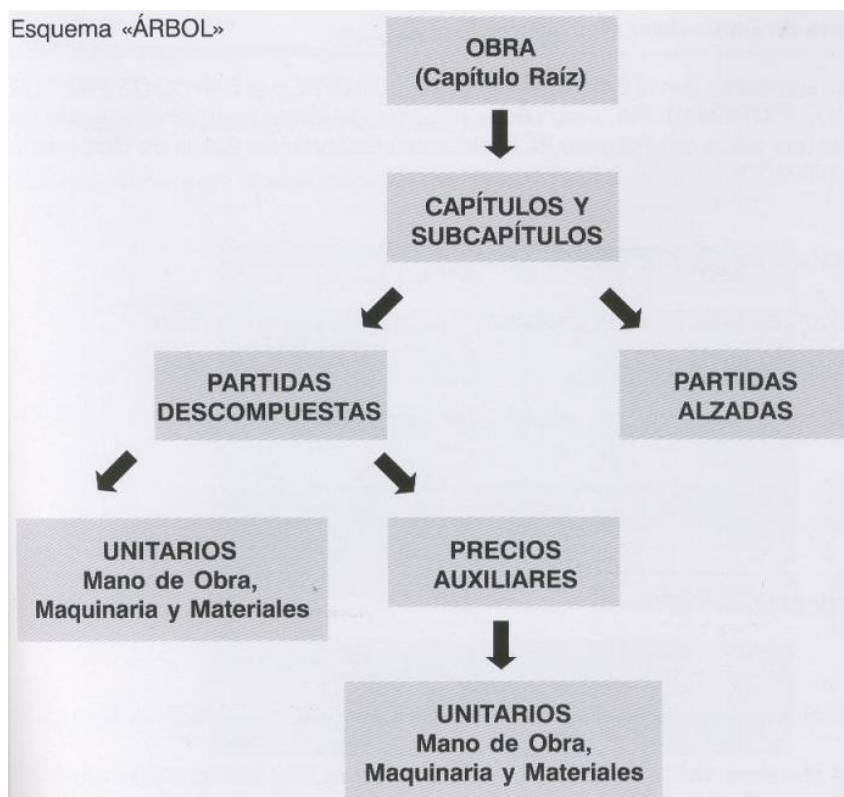


Figure 2.1: Screenshot of the tree structure of the database of Arquimedes

It also allows a direct connection to the Construction's Prices' Generator and the Rehabilitation's Prices' Generator, both of CYPE Ingenieros. It does not operate directly with the BEDEC -to do this it should convert its format to BC3 before-.

Arquimedes can work with two types of specifications: the conventional bases of prices' ones and the Prices Generator's ones. In this case, when a work unit is imported from Generator to Arquimedes, the information about the specifications of the concerned work unit is imported too. Then, estimates created on Arquimedes -which gets prices from Generator- automatically include specifications adapted to the CTE (Technical Construction Code).

Prices' Generator

It is a tool that allows technicians of the construction sector to obtain prices with expected costs. It is the software which we are going to use in this project because it is free to be copied and distributed, and it also contains a lot of information, and with the addition of being one of the more used bases of prices.

For getting the prices, the program includes a parametric system that quotes several typological, geographical and economic options that impact to the final cost of the work. Choosing these parameters, the Generator adjusts the prices to the building which we are working on. Moreover, it also includes products from leading manufacturers, with all the options for each of them.

The adjustable factors that the Generator includes are the following ones:

1. The geographical area which runs the project in and the corresponding market prices

Affecting the performance of labour and machinery:

2. The volume of work (the construction surface and the plant type surface)
3. The type of housing and its location
4. The geometric complexity of the plant types
5. The number of floors above and below ground
6. The average surface of the floor
7. The degree of difficulty in work accesses
8. The topographic difficulty of the plot

Affecting the prices of materials and machinery:

9. The purchase volume (constructed area, portfolio recruitment)
10. The market conditions

The ability to choose all these factors is the reason why we consider the Price's Generator of CYPE Ingenieros as a multiparametric base.

CYPE sells the connection between Price's Generator and Arquimedes. We can export the work items from Generator –one by one- including descriptions, takeoff criteria, use and maintenance instructions, and decomposition to machinery, materials and labour. It also allows connection to other programs like Presto or FIEBDC-3.

As CYPE Ingenieros a private company, when choosing materials and building solutions, the Prices' Generator provides the ability to choose directly among the brands of leading manufacturers and -through this choice- to complete the definition of the project with new parameter settings.

The CYPE's base of prices is only presented in computer format (in Prices' Generator and integrated into other software of the company) and is not published on paper.

Difference between Arquimedes and Prices' Generator

Although there are programs of CYPE and there exists an interconnection between them - and at the same time with other software of the company-, Arquimedes is software purely about estimating calculation, but the Generator is just the base of prices written by CYPE Ingenieros, and it allows to parameterize and consulting work items.

The most important point is this interconnection. The Prices' Generator gives you a previous price about item of the previously described building, but still gives you options to define it, so not being fully adjusted to reality.

Then when move the result to Arquimedes -for it is necessary to have software interconnection module, and we have to move item by item-, that is software that lets modifying or adding more specific about the work place parameters to the exported item from the Generator. This way, we get a more accurate result.

It should be mentioned that Arquimedes integrates the Generator's base of prices.

3 COMPARATIVE ANALYSIS

3.1 GENERAL METHODOLOGY

This section describes the methodology used for realizing the comparison between the selected chapters of the two bases of prices.

3.1.1 METHOD OF COMPARISON BY LEVELS

As both databases have divergent ways of grouping items, include activities not considered in the other base and, ultimately, are made with different systems, it is not possible to make an analysis item by item.

We have proceeded to compare selected chapters in a staggered way, starting with the distribution of the own chapters, then with sub chapters, paragraphs and work items. This is what we call comparison by levels, being a level each of these steps.

Now we see an example of how the Prices' Generator and the BEDEC base use a tree structure, with the same number of levels. Taking one work item of the two bases, we will see the path they follow (Figure 3.1).

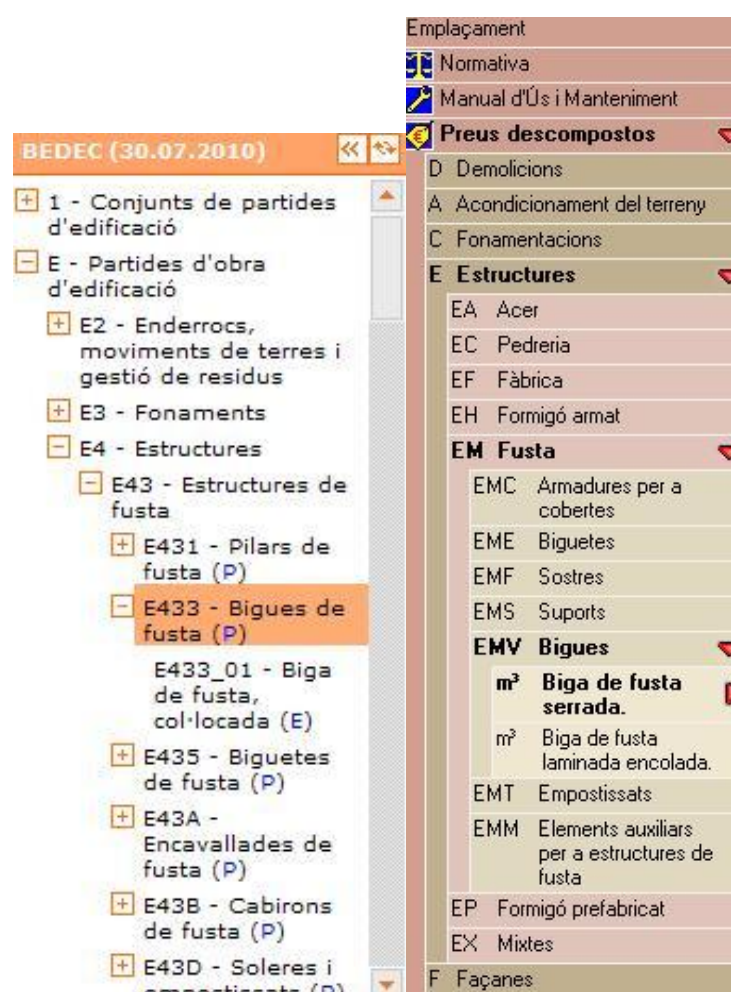


Figure 3.1: Screenshot of the tree structure of Prices'Generator and BEDEC

In Table 3.1 we can see how much similar the structure between both bases is.

	ITeC	CYPE INGENIEROS
CHAPTER	Structures	Structures
SUB CHAPTER	Wood structures	Wood
SECTION	Wood beams	Wood beams
WORK ITEM	- Placed wood beam	- Sawed wood beam - Glued laminated wood beam

Table 3.1 Simplified table of the structure followed by BEDEC and Prices' Generator for the chosen example

3.1.2 DIRECTION OF COMPARISON

For achieving a greater degree of clarity, we have done all comparisons starting from the BEDEC's base and facing it to the Prices' Generator, instead of doing it on the contrary. As we explain in point 3.2.3., we started from the building type of the BEDEC base, and, according with this decision, we have decided to do all comparisons in the same direction.

Thus, in figures corresponding to screenshots -or assemblies of them- containing elements of both bases, we have placed BEDEC elements at the left side whenever it has been possible.

3.2 INITIAL PARAMETERS

3.2.1 KIND OF PRICES

Accessing to the BEDEC base, we can see that it separates the work items of the different areas of the construction sector (building, rehabilitation-restoration, civil engineering, building maintenance, urbanization and maintenance of urbanization and civil engineering). In this case we will focus on the comparison of the construction sector.

In the case of the Prices' Generator, however, these areas are included in different versions of the program, and it would be necessary to download the specific version of each one. To do this project, we have used the base of prices that includes only the building work items.

3.2.2 GEOGRAPHICAL AREA OF THE PLACE

The BEDEC base contains the reference prices of construction for Barcelona, Girona, Lleida and Tarragona. To compare, we have chosen prices for the province of Barcelona.

In the case of the Prices' Generator, the program allows us to choose the province and even the municipality where is our work place located. We will choose Barcelona in both cases.

3.2.3 SPECIFIC FEATURES OF THE WORK AND BUILDING TYPE

In order to make a correct comparison, it is necessary to match the characteristics of the work place in both bases.

We will take as reference data considered by ITeC to define its building type, more specifically the new building one, so this base does not allow us the possibility to change directly this building type. We only have the possibility of applying coefficients that adjust the amounts according to the volume of the work place (Figure 3.2).

3.2.3 Coeficients de preus en funció del volum d'obra

Obra nova

La Comissió tècnica del banc BEDEC (*) va elaborar un estudi per tal de trobar uns coeficients que permetessin corregir els imports dels elements d'aquest banc de preus de referència en base al volum d'obra.

(*) Comissió formada per empreses representants de la administració pública, la Cambra Oficial de Contractistes d'Obres de Catalunya (CCOC), el Gremi de Constructors d'Obres de Catalunya, representants de fabricants i d'aplicadors, els col·legis professionals i l'ITeC.

Tenint en compte que el tipus d'obra de referència del quadre de preus correspon a un pressupost d'execució material (PEM) al voltant de 1,712 milions € i, per tant, amb un coeficient corrector de volum d'obra igual a 1, els coeficients recomanats per a volums diferents són:

- Obres de PEM de 0,428 milions €: 1,124 per a obres d'edificació; 1,139 per a obres d'urbanització; 1,085 per a obres d'enginyeria civil.
- Obres de PEM de 4,260 milions €: 0,905 per a obres d'edificació; 0,861 per a obres d'urbanització; 0,901 per a obres d'enginyeria civil.

Per a obres de PEM entremig es deduirà el coeficient proporcionalment. Per a obres de PEM inferior a 0,428 milions € o superior a 4,260 milions € no s'ha establert cap coeficient.

Figure 3.2: Screenshot of the coefficients from ITeC's book "Preus de referència d'edificació 2008"

The Prices' Generator, when it has been downloaded, allows us to vary the characteristics of the building which we want to contemplate. Due to the limitations of the BEDEC base when modifying its building type, we will adapt the Generator's building to the BEDEC one, so following the direction of comparison previously established for all the report.

The building type of BEDEC base is a residential building built in the urban centre, new building, approximately 2500m², 4 floors above ground and 1 below ground, and with a normal construction process (not conflictive).

The base of prices of CYPE Ingenieros allows to specify more parameters than those mentioned in the ITeC's one. Therefore, we will match those who are possible, and we will designate the rest as the Generator suggests by default. These parameters presented only in the Prices' Generator slightly affect to work items' amounts. So presumably the results of the comparison between the two bases of prices will be low affected.

3.3 PREVIOUS LEVEL

We have defined as "previous level" the initial state where we find each base when we access in it. In Figures 3.3 and 3.4 we can see, respectively, the initial states of the BEDEC base and the Prices' Generator.

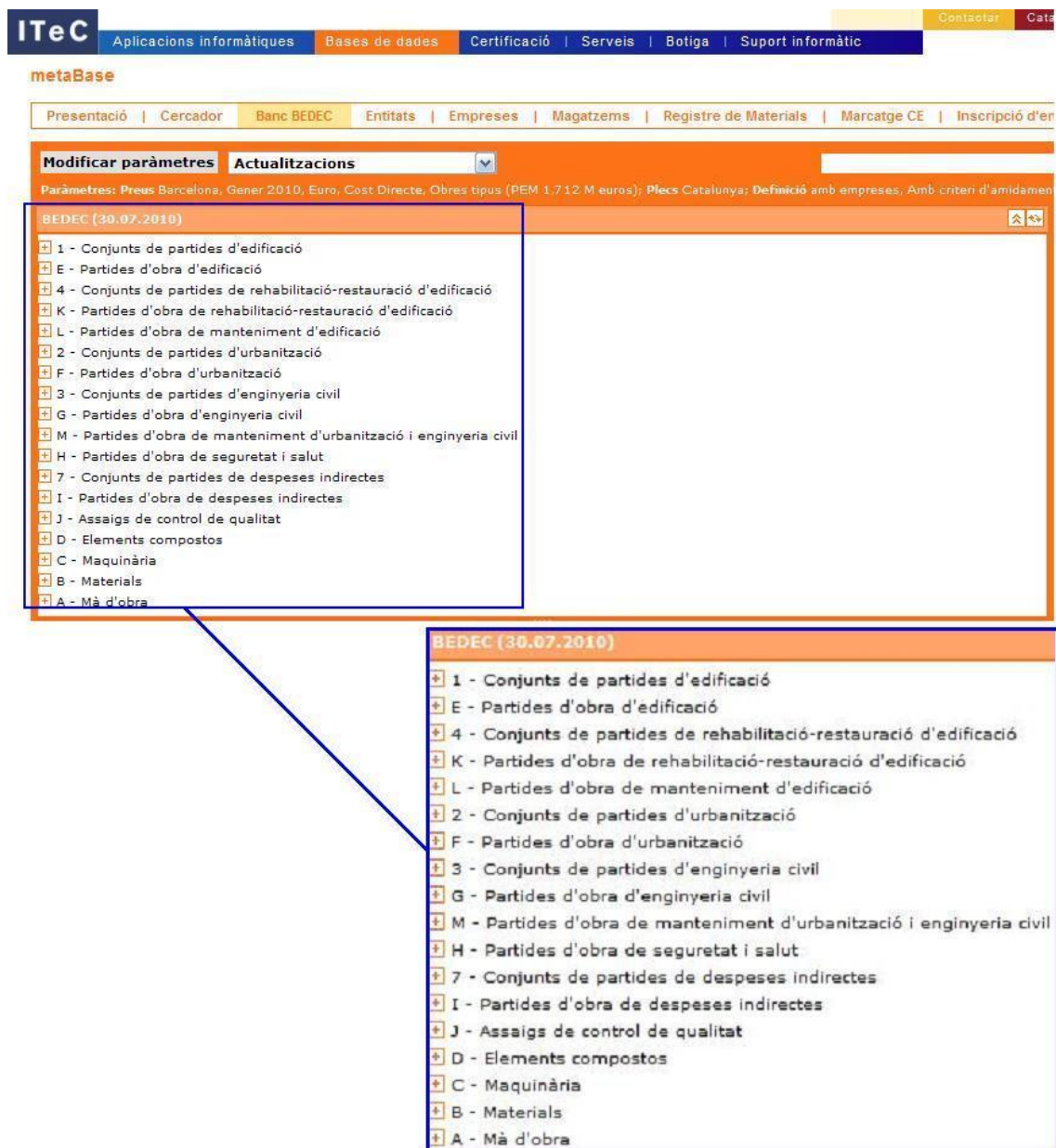


Figure 3.3: Screenshot of the previous level of the BEDEC base

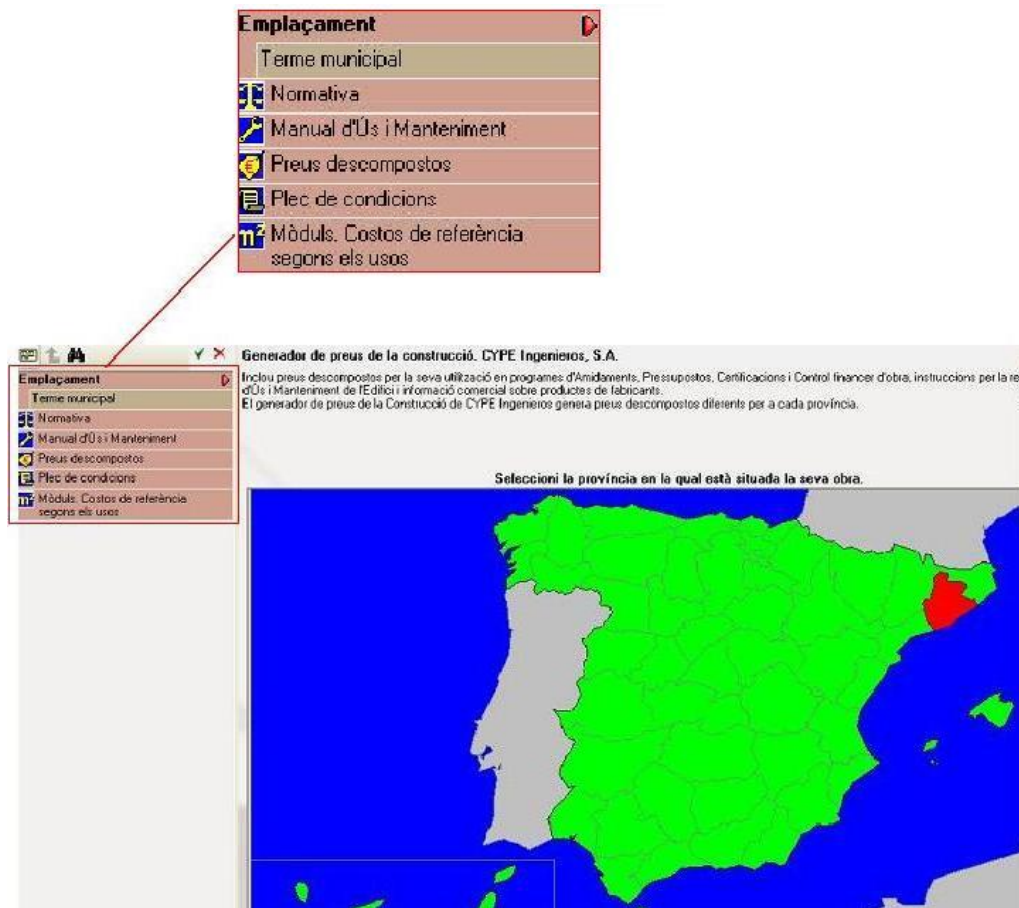


Figure 3.4: Screenshot of the previous level of the Prices' Generator.

3.3.1 SELECTION OF INITIAL PARAMETERS

Before the starting of studying the classification system of both bases and their characteristics, we have to choose a number of parameters, in addition to the conditions of the work that we have discussed above, to adjust the comparison as possible.

BEDEC base

When acceding to the BEDEC base, we will open the "Modify parameters" window, where we will mark the following aspects (Figure 3.5):

- Date of Prices: January 2010
- Scope of Prices: Barcelona
- Scope of Specifications: Catalonia
- Variation of prices according to the volume of new work: Type Works (PEM 1.712 million Euros)
- Currency: Euro
- Definition of work items: description including commercial products
- Add the takeoff criterion to the definition: Yes
- Kind of prices: Direct Cost

The justification for most of the parameters is at the 3.2.3 section -"Specific features of the work and building type"- . The other parameters are justified as follows:

- The date of prices is January 2010 because is the one that best fits the chosen date in the Generator (December 2009).
- The currency is the Euro because it is the current monetary unit (and it is the only option that the base allows).
- The definition of the work items with commercial products and the addition of the takeoff criteria will provide more information along with the work item. This information can be useful when making comparison between both bases.
- Prices will be in direct cost, as detailed in section 3.7.1.

Modificar paràmetres Actualitzacions

Paràmetres: Preus Barcelona, Gener 2010, Euro, Cost Directe, Obres tipus (PEM 1,712 M euros)

BEDEC (30.07.2010)

- 1 - Conjunts de partides d'edificació
- E - Partides d'obra d'edificació
- 4 - Conjunts de partides de rehabilitació-restauració d'edificació
- K - Partides d'obra de rehabilitació-restauració d'edificació
- L - Partides d'obra de manteniment d'edificació
- 2 - Conjunts de partides d'urbanització
- F - Partides d'obra d'urbanització
- 3 - Conjunts de partides d'enginyeria civil
- G - Partides d'obra d'enginyeria civil
- M - Partides d'obra de manteniment d'urbanització i enginyeria civil
- H - Partides d'obra de seguretat i salut
- 7 - Conjunts de partides de despeses indirectes
- I - Partides d'obra de despeses indirectes
- J - Assaigs de control de qualitat
- D - Elements compostos

Modificar Paràmetres

En aquesta pàgina podeu definir els paràmetres que caracteritzaran el resultat de la vostra cerca

Data de preus: Gener 2010

Àmbit de preus: Barcelona

Àmbit de plecs: Catalunya

Variació de preus segons el Volum d'Obra Nova: Obres tipus (PEM 1,712 M euros)

Divisa: Euro

Definició partides d'obra:

- ☐ descripció genèrica, sense inclusió de productes comercials
- ☐ descripció per a projectes de promoció pública (amb productes comercials, o similar)
- ☒ descripció amb inclusió de productes comercials

Afegir el criteri d'amidament a la definició:

- ☐ No
- ☒ Si

Tipus de preu:

- ☒ CD (cost directe: inclou mà d'obra, materials, maquinària i despeses auxiliars)
- ☐ PEM (cost d'execució material): CD amb 0 % de DI (despeses indirectes)
- ☐ PEC (cost d'execució per contractar): PEM amb 0 % de DG (despeses generals) i 0 % de BI (benefici industrial), sense IVA

Figure 3.5: Screenshot of the modification of parameters in the BEDEC base

Prices' Generator

At this base we have to select the parameters in two different places.

The first one is at the “Emplaçament” tab (Emplacement), which is the initial state of the Prices' Generator. We will mark there the province where our building belongs to. In our case, it is Barcelona (Figure 3.4). When chosen, we will also mark the municipality, in this case Barcelona itself (Figure 3.6).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
Badalona																					
Badia del Vallès																					
Bagà																					
Balenyà																					
Balsareny																					
Barberà del Vallès																					
Barcelona																					
Begues																					
Bellprat																					
Berga																					
Bigues i Riells																					
Borredà																					

Figure 3.6: Screenshot of the election of the municipality of the Prices' Generator

The second one is in the “Preus descompostos” (decomposed prices) tab, where we will select parameters related to the building types (Figure 3.7). Then, we will introduce a 2500m² total built area, a 500m² plant type area, 4 floors above ground and one underground. We will consider flats as the type of housing, and the situation between borders. We will leave the parameters that the BEDEC does not specify as they come by default: good accessibility and topography with minimal slopes.

We deduce that BEDEC has already incorporated the changes in prices caused by the current economic situation. So we will choose a market with downturn accused in the Prices' Generator (crisis).

Superfície total construïda	2500.00 m ²	Número de plantes sobre rasant	4
Superfície de la planta tipus	500.00 m ²	Número de plantes sota rasant	1
Accessibilitat <input type="radio"/> Molt bona <input checked="" type="radio"/> Bona <input type="radio"/> Normal <input type="radio"/> Dificultat mitja <input type="radio"/> Dificultat alta			
Topografia <input type="radio"/> Plana <input checked="" type="radio"/> Desnivells mínims <input type="radio"/> Desnivells acusats <input type="radio"/> Accidentada <input type="radio"/> Molt accidentada			
Mercat <input type="radio"/> En alça <input type="radio"/> Creixement moderat <input type="radio"/> Creixement sostingut (normal) <input type="radio"/> Recessió moderada <input checked="" type="radio"/> Recessió acusada (crisis)			
Tipus d'habitatge <input type="radio"/> Unifamiliar <input type="radio"/> Adossades <input checked="" type="radio"/> Plurifamiliars <input type="radio"/> Altres usos		Situació <input checked="" type="radio"/> Entre mitgeres <input type="radio"/> En xamfrà <input type="radio"/> Aïllat	
Geometria de la planta 			

Figure 3.7: Screenshot of the conditions of work place in the Prices' Generator

In the section where the program allows us to choose the geometry of the plant, after we clicked on the picture, we will choose the one that comes by default in the popup window (Figure 3.8).



Figure 3.8: Screenshot of the geometry of the plant options in the Prices' Generator

3.3.2 COMPARATIVE ANALYSIS

BEDEC base

When these initial parameters are set, we will find a classification system differentiated to the Prices' Generator system. At first, the scheme begins with the following classification:

- Groups of building items
- Building work items
- Groups of building rehabilitation-restoration items
- Building rehabilitation-restoration work items
- Building maintenance work items
- Groups of urbanization items
- Urbanization work items
- Groups of civil engineering items
- Civil engineering work items
- Groups of civil engineering and urbanization maintenance items
- Safety and health work items
- Groups of indirect costs items
- Indirect costs work items
- Quality control tests
- Composite elements
- Machinery
- Materials
- Labour

We can note that, at this previous level, the BEDEC base covers all their bases of prices related to the sector, distinguishing between work items and groups of work items. In addition, it allows direct consultation of the prices of composite elements, indirect costs, materials, machinery and labour.

Prices' Generator

When accessing to the Generator, we find the following tabs (Figure 3.9):

- "Emplaçament" (Emplacement)
- "Normativa" (Regulations)
- "Manual d'ús i manteniment" (Use and maintenance manual)
- "Preus descompostos" (Decomposed prices)
- "Plec de condicions" (Specifications)
- "Mòduls. Costos de referència segons els usos" (Modules. Reference costs according to uses)

The tab "Location", which coincides with the initial state of the Prices' Generator, gives us the option to mark the province and the municipality, as we explained before (Section 3.3.1).

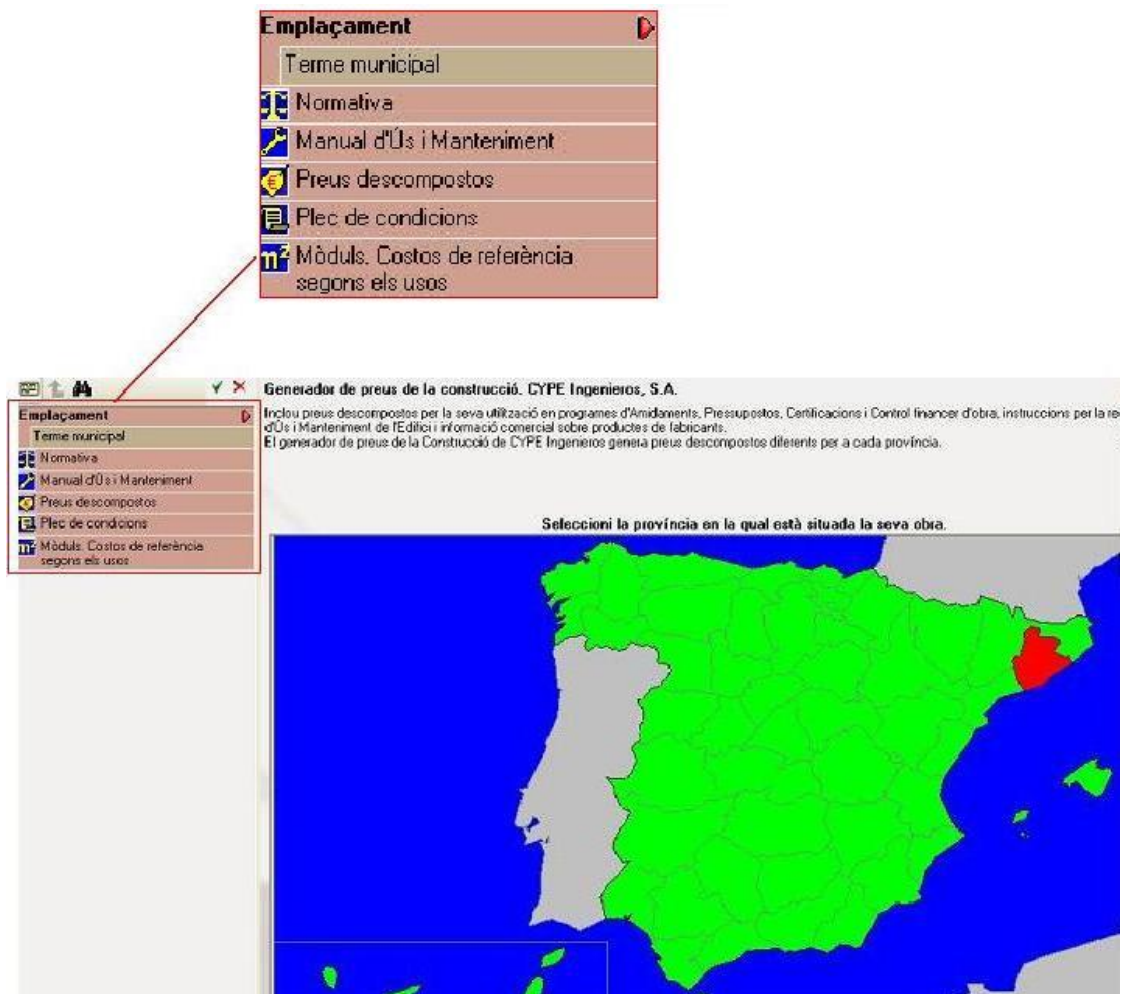


Figure 3.9: Screenshot of the 'Location' tab in the Prices' Generator

In the "Regulations" tab we find general regulations and referred to each chapter ones. All necessary documentation and all the regulations for every aspect of construction is here (Figure 3.10).

In "Use and maintenance manual" tab we find the use and maintenance proceedings related with items included in each chapter (Figure 3.11). It is a manual that aims to facilitate the correct use and maintenance of the building, to maintain over time the functional and aesthetic characteristics of it.



Figure 3.10: Screenshot of the “Regulations” tab, particularly the foundations one, at the Prices’ Generator

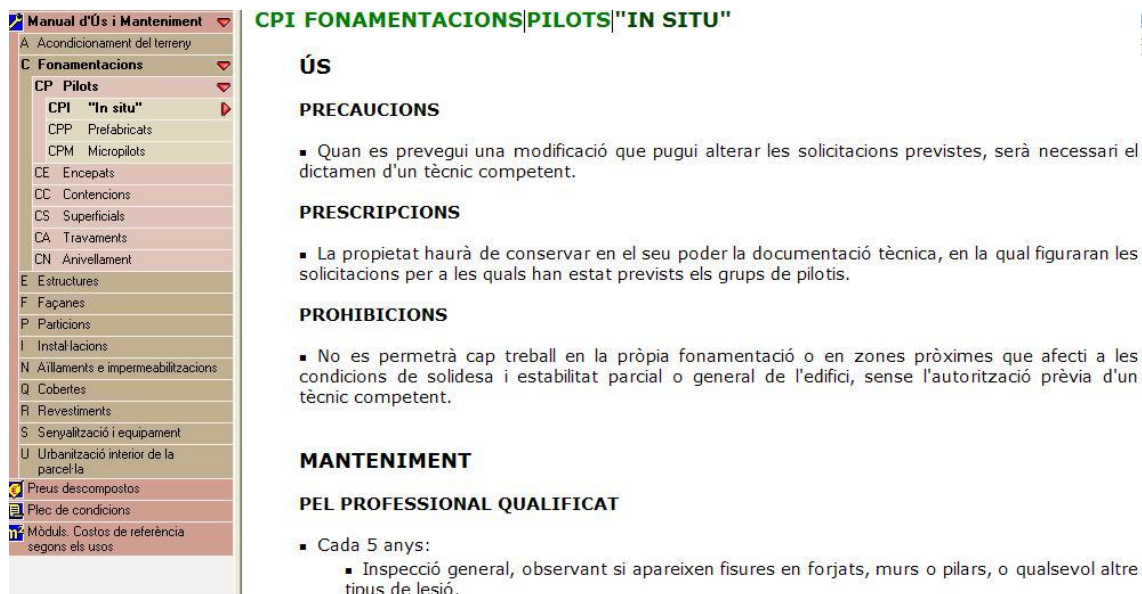


Figure 3.11: Screenshot of the “Use and maintenance manual” tab, in particular the in situ piles one, at the Prices’ Generator

In “Decomposed prices” tab we find, as an initial screen, parameters determining for the work place (Figures 3.7 and 3.8). When they are chosen, we can see the base of prices itself, at the first level, the chapter one (Figure 3.12). The comparison of this level is at section 3.4.

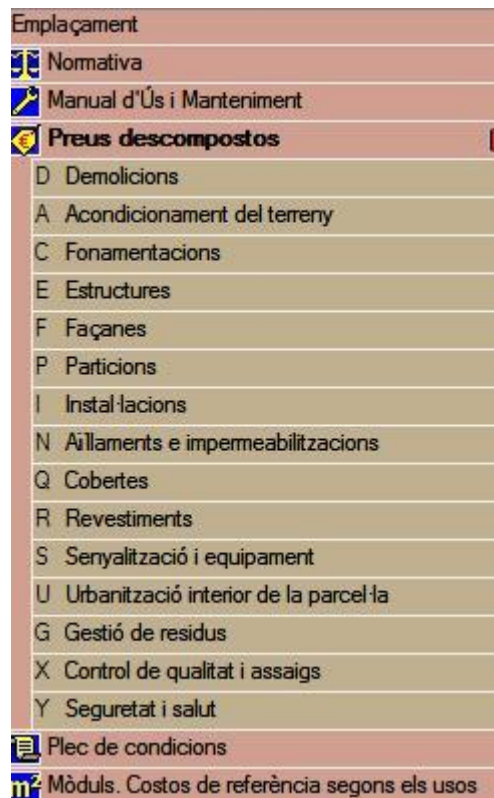
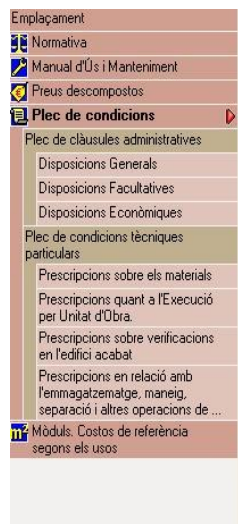


Figure 3.12: Screenshot of “Decomposed prices” tab decomposing at the Prices’ Generator

The next tab that we find is the “Regulations” one, where there are all the conditions that the building must accomplish, either related with administrative matters and with particular matters (Figure 3.13).



Segons figura en el Codi Tècnic de l'Edificació (CTE), aprovat mitjançant Reial decret 314/2006, de 17 de març, el projecte definirà les obres projectades amb el detall adequat a les seves característiques, de manera que pugui comprovar-se que les solucions proposades compleixen les exigències bàsiques del CTE i altra normativa aplicable. Aquesta definició inclourà, almenys, la següent informació continguda en el Plec de Condicions:

- Les característiques tècniques mínimes que han de reunir els productes, equips i sistemes que s'incorporin de forma permanent a l'edifici projectat, així com les seves condicions de subministrament, les garanties de qualitat i el control de recepció que hagi de realitzar-se. Aquesta informació es troba en l'apartat corresponent a les Prescripcions sobre els materials, del present Plec de Condicions.
- Les característiques tècniques de cada unitat d'obra, amb indicació de les condicions per a la seva execució i les verificacions i controls a realitzar per a comprovar la seva conformitat amb l'indicat en el projecte. Es precisaran les mesures a adoptar durant l'execució de les obres i en l'ús i manteniment de l'edifici, per a assegurar la compatibilitat entre els diferents productes, elements i sistemes constructius. Aquesta informació es troba en l'apartat corresponent a les Prescripcions quant a l'execució per unitats d'obra del present Plec de Condicions.
- Les verificacions i les proves de servei que, si s'escau, han de realitzar-se per a comprovar les prestacions finals de l'edifici. Aquesta informació es troba en l'apartat corresponent a les Prescripcions sobre verificacions en l'edifici acabat, del present Plec de Condicions.

Figure 3.13: Screenshot of “Regulations” tab at the Prices’ Generator

Finally, we find the “Modules: Reference costs according to uses” tab, where we can see what are the approximate costs -in €/m²- about the demolition and construction of our building, adjusting it to a number of parameters (Figure 3.14).

Emplaçament	Mòduls. Costos de referència segons els usos.	
Normativa	DEMOLICIONS	
Manual d'Ús i Manteniment	Demolició d'edifici exempt	31.75 €/m ²
Preus descompostos	Demolició d'edifici amb un contigu	37.47 €/m ²
Plec de condicions	Demolició d'edifici amb dos o més contigus	40.07 €/m ²
Mòduls. Costos de referència segons els usos	Per analitzar amb més gran detall el cost de la demolició, pot utilitzar la opció "Preus descompostos"	
Demolicions		
Arquitectura residencial		
Rehabilitacions, ampliacions, reformes i restauracions		
Arquitectura no residencial		

Figure 3.14: Screenshot of the "Modules: Reference costs according to uses" tab at the Generator

Comments

As we can see, the initial states of the BEDEC base and the Prices' Generator are quite different. Therefore, it becomes necessary a comparison of these previous levels. We have found the following notable differences:

1. In both we have to mark some parameters before starting making the comparison:
 - The location, that is the same in both bases in regard to the province. The Prices' Generator, however, allows the entering of the specific municipality where the work is done.
 - The characteristics of the type of building. The BEDEC base does not allow modifying them so it only allows us to apply coefficients on prices according to the total cost of the work. Prices' Generator, however, allows to change completely the type of building, providing also additional parameters such as accessibility and topography of the work place.

In our opinion, the Prices' Generator offers so much and more useful options to define the building we will work with and the conditions of the work. The options offered by the BEDEC base seem insufficient in comparison, so we believe it is easier to obtain data such as surface or the number of plants than the final cost of the building.

2. The BEDEC base separates the items of the groups of items. This difference will be studied more carefully at the comparison of the level of work items.

3. The BEDEC base also includes prices corresponding to the fields of rehabilitation-restoration, civil engineering, building maintenance, urbanization and urbanization and civil engineering maintenance. By contrast, CYPE Ingenieros only has a Prices' Generator for rehabilitation, which must be downloaded separately from the Prices' Generator. This way, ITeC offers a more complete base of prices, but more confusing at first look than the CYPE one.

4. The base of ITeC allows us to see indirect costs, labour, materials, machinery and composite elements separately. The Generator does not offer this possibility. This is an aspect where it is surpassed on this comparison.

5. The Prices' Generator has chapters about the health and safety and the quality control tests, while the BEDEC base includes these two concepts at this previous level. This difference is about the internal organization of the base, and we do not consider it transcendent so far. However, we think that the CYPE's choice is more appropriate because it brings better organization at eye level. However, due to ITeC includes the cost of quality control tests within the indirect costs -as the document "Guia d'instal·lació, contingut i criteris" (Criteria, content and installation guide)-, we think that this item should be within "Indirect costs work items" as a matter of consistency.

In our opinion, the Prices' Generator is a more intuitive base at the previous level. So this is a very positive aspect for users not used with these two bases. The BEDEC base, however, is more complete.

3.4 LEVEL OF CHAPTERS

Now we will expand the "Building work items" tab at BEDEC base and the "Decomposed Prices" tab at the Generator. Here are the chapters (Figure 3.15).

E - Partides d'obra d'edificació	
+ E2 - Enderrocs, moviments de terres i gestió de residus	Emplaçament
+ E3 - Fonaments	Normativa
+ E4 - Estructures	Manual d'Ús i Manteniment
+ E5 - Cobertes	Preus descompostos
+ E6 - Tancaments i divisòries	D Demolicions
+ E7 - Impermeabilitzacions i aïllaments	A Acondicionament del terreny
+ E8 - Revestiments	C Fonamentacions
+ E9 - Paviments	E Estructures
+ EA - Tancaments i divisòries practicables	F Façanes
+ EB - Proteccions i senyalització	P Particions
+ EC - Envidraments	I Instal·lacions
+ ED - Instal·lacions d'evacuació	N Aïllaments e impermeabilitzacions
+ EE - Instal·lacions de climatització, calefacció i ventilació mecànica	Q Cobertes
+ EF - Tubs i accessoris per a gasos i fluids	R Revestiments
+ EG - Instal·lacions elèctriques	S Senyalització i equipament
+ EH - Instal·lacions d'enllumenat	U Urbanització interior de la parcel·la
+ EJ - Instal·lacions de lampisteria i aparells sanitaris	G Gestió de residus
+ EK - Instal·lacions de gas combustible i altres gasos i fluids	X Control de qualitat i assaigs
+ EL - Instal·lacions de transport	Y Seguretat i salut
+ EM - Instal·lacions contra incendis i de seguretat	Plec de condicions
+ EN - Vàlvules, filtres, bombes i grups de pressió	Mòduls. Costos de referència segons els usos
+ EP - Instal·lacions audiovisuals i de comunicació	
+ EQ - Equipaments	
+ ER - Jardineria	
+ EY - Ajudes del ram de paleta	

Figure 3.15: Level of chapters at BEDEC base and Prices' Generator

At a first look, we can see that the tree structure is similar in both bases, but the number of chapters contained is different, and the way of dividing them, in some cases, is different too.

The chapters that match the two classifications are the foundations, structures, decks and the isolation and waterproofing (Figure 3.16).

Others also agree, but are grouped differently. This is the case of "Demotions, earthmoving and waste management" chapter, which in BEDEC base form only one chapter. This chapter is divided into three different chapters in Prices' Generator. We can also appreciate this, but in the opposite direction, in the case of installations, which in the case of BEDEC base are classified into eleven chapters, but in the Prices' Generator are classified only into one (Figure 3.17).

E - Partides d'obra d'edificació	
+ E2 - Enderrocs, moviments de terres i gestió de residus	
+ E3 - Fonaments	
+ E4 - Estructures	
+ E5 - Cobertes	
+ E6 - Tancaments i divisòries	
+ E7 - Impermeabilitzacions i aïllaments	
+ E8 - Revestiments	
+ E9 - Paviments	
+ EA - Tancaments i divisòries practicables	
+ EB - Proteccions i senyalització	
+ EC - Envidraments	
+ ED - Instal·lacions d'evacuació	
+ EE - Instal·lacions de climatització, calefacció i ventilació mecànica	
+ EF - Tubs i accessoris per a gasos i fluids	
+ EG - Instal·lacions elèctriques	
+ EH - Instal·lacions d'enllumenat	
+ EJ - Instal·lacions de lampisteria i aparells sanitaris	
+ EK - Instal·lacions de gas combustible i altres gasos i fluids	
+ EL - Instal·lacions de transport	
+ EM - Instal·lacions contra incendis i de seguretat	
+ EN - Vàlvules, filtres, bombes i grups de pressió	
+ EP - Instal·lacions audiovisuals i de comunicació	
+ EQ - Equipaments	
+ ER - Jardineria	
+ EY - Ajudes del ram de paleta	

Emplaçament	
Normativa	
Manual d'Ús i Manteniment	
Preus descompostos	
D Demolicions	
A Acondicionament del terreny	
C Fonamentacions	
E Estructures	
F Façanes	
P Particions	
I Instal·lacions	
N Aïllaments e impermeabilitzacions	
Q Cobertes	
R Revestiments	
S Senyalització i equipament	
U Urbanització interior de la parcel·la	
G Gestió de residus	
X Control de qualitat i assaigs	
Y Seguretat i salut	
Plec de condicions	
Mòduls. Costos de referència segons els usos	

Figure 3.16: Chapters matching at the BEDEC base and the Prices' Generator

E - Partides d'obra d'edificació	
+ E2 - Enderrocs, moviments de terres i gestió de residus	
+ E3 - Fonaments	
+ E4 - Estructures	
+ E5 - Cobertes	
+ E6 - Tancaments i divisòries	
+ E7 - Impermeabilitzacions i aïllaments	
+ E8 - Revestiments	
+ E9 - Paviments	
+ EA - Tancaments i divisòries practicables	
+ EB - Proteccions i senyalització	
+ EC - Envidraments	
+ ED - Instal·lacions d'evacuació	
+ EE - Instal·lacions de climatització, calefacció i ventilació mecànica	
+ EF - Tubs i accessoris per a gasos i fluids	
+ EG - Instal·lacions elèctriques	
+ EH - Instal·lacions d'enllumenat	
+ EJ - Instal·lacions de lampisteria i aparells sanitaris	
+ EK - Instal·lacions de gas combustible i altres gasos i fluids	
+ EL - Instal·lacions de transport	
+ EM - Instal·lacions contra incendis i de seguretat	
+ EN - Vàlvules, filtres, bombes i grups de pressió	
+ EP - Instal·lacions audiovisuals i de comunicació	
+ EQ - Equipaments	
+ ER - Jardineria	
+ EY - Ajudes del ram de paleta	

Emplaçament	
Normativa	
Manual d'Ús i Manteniment	
Preus descompostos	
D Demolicions	
A Acondicionament del terreny	
C Fonamentacions	
E Estructures	
F Façanes	
P Particions	
I Instal·lacions	
N Aïllaments e impermeabilitzacions	
Q Cobertes	
R Revestiments	
S Senyalització i equipament	
U Urbanització interior de la parcel·la	
G Gestió de residus	
X Control de qualitat i assaigs	
Y Seguretat i salut	
Plec de condicions	
Mòduls. Costos de referència segons els usos	

Figure 3.17: Chapters grouped different at the BEDEC base than at the Prices' Generator

Another difference is the distribution of exterior walls, interior walls and openings. The BEDEC base divides it into a chapter referring only to closings -from the facade until the partition walls- called "Tancaments i divisòries" (closings and partitions), and one for everything related to the openings (doors and windows) called "Tancaments i divisòries practicables" (practicable closings and partitions). Moreover, the Prices' Generator divides into the chapter "Façanes" (facades) -that includes both the openings and closings of these openings-, and the chapter "Particions" (partitions) (Figure 3.18).

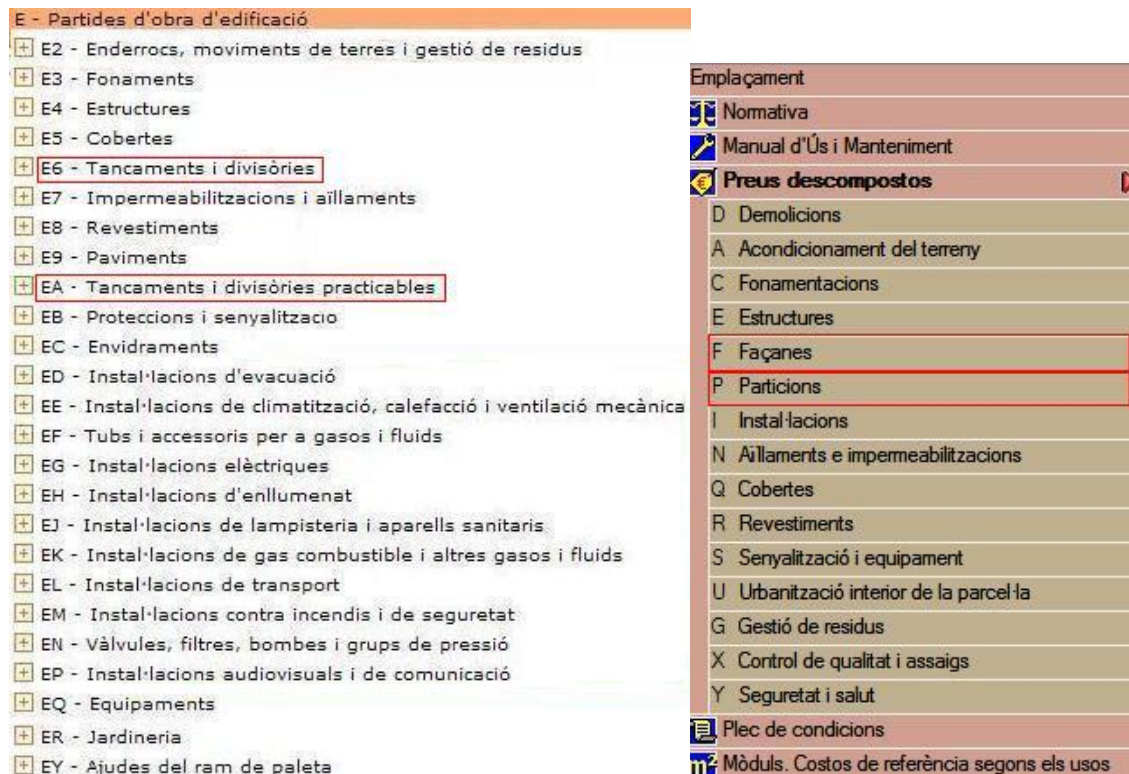


Figure 3.18: Screenshot of the chapters of closings and openings at the BEDEC base and the Prices' Generator

Later, we can see that the BEDEC base subdivides the chapters about "Revestiments" (coatings) and "Senyalitzacions i equipament" (signaling and equipment) more than Prices' Generator. The base of CYPE compresses the coatings in a single chapter, including pavements, while the ITeC one differentiates it into two different. The same happens with the equipment and signaling (Figure 3.19).

One aspect in which Generator is more complete is that it has a chapter titled "Urbanització interior de la parcel·la" (inside urbanization of the plot), which includes gardening, swimming pools, parks and irrigation, among others, while BEDEC base only makes mention of gardening (Figure 3.20).

A remarkable aspect which these bases are highly differentiated in is on the issues of "Control de qualitat i assaigs" (quality control and tests) and "Seguretat i salut" (Health and safety), so each base put them on a different level. The Prices' Generator places them at the level of chapters, but the BEDEC base puts them at the previous level, considering them as elements out of the definition of what it considers a "chapter" (Figure 3.21).

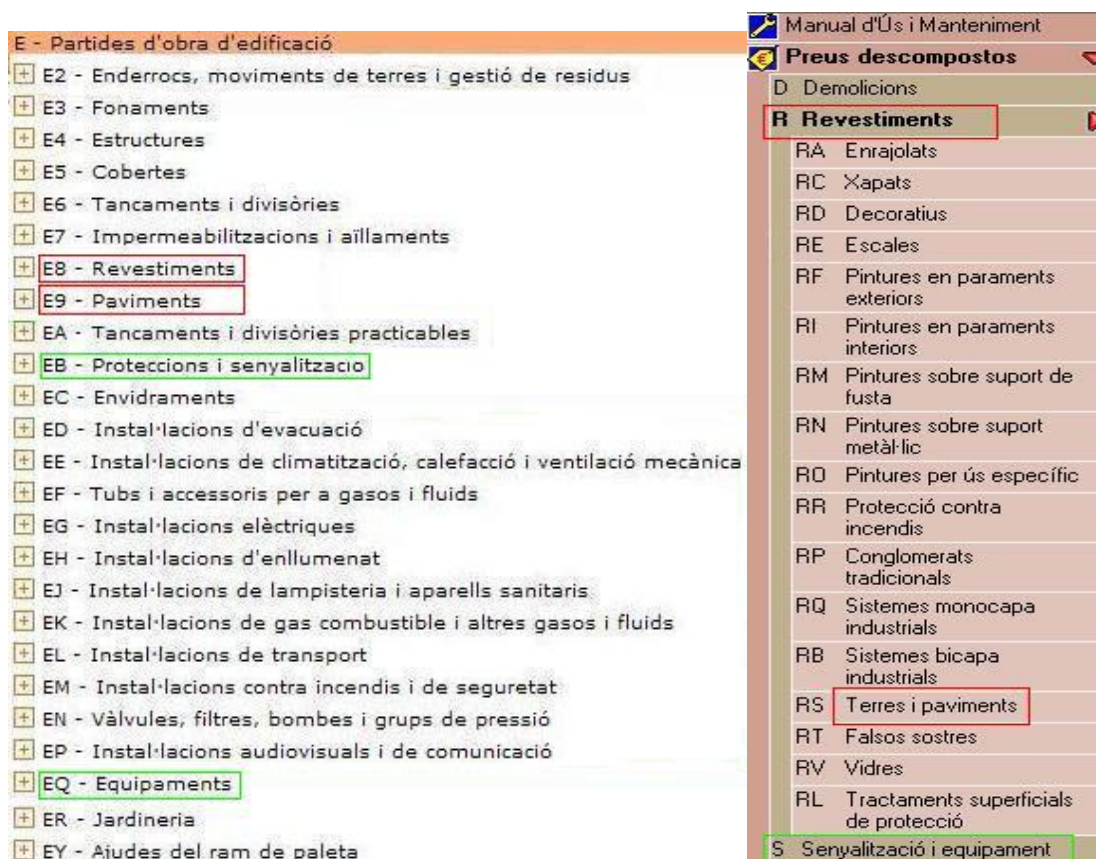


Figure 3.19: Screenshot of coatings, signalling and equipment chapters at the BEDEC base and the Prices' Generator

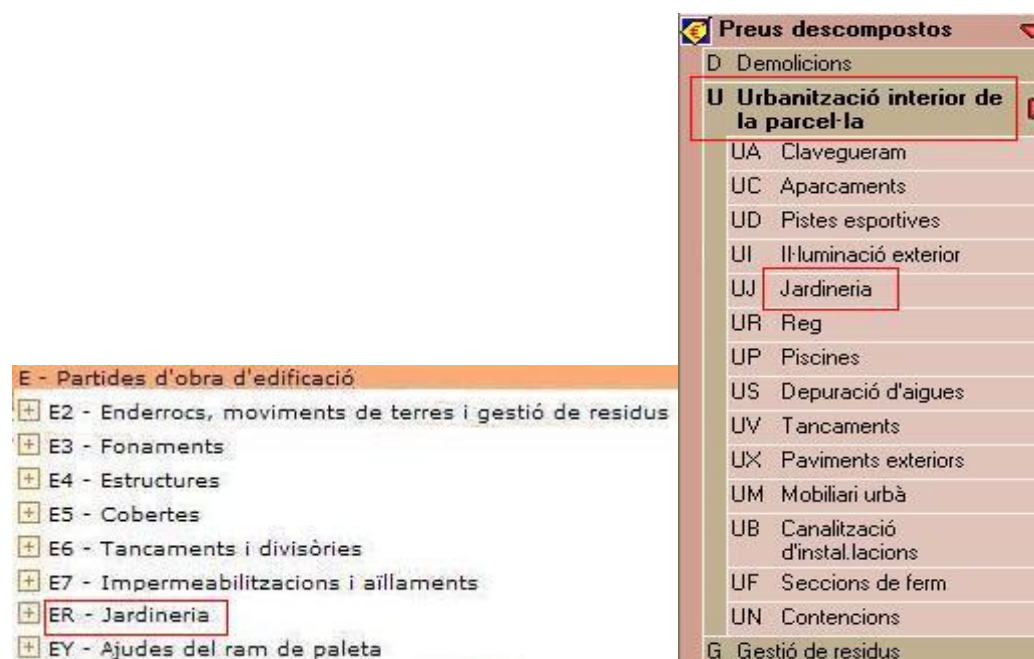


Figure 3.20: Screenshot of the gardening chapter at both bases

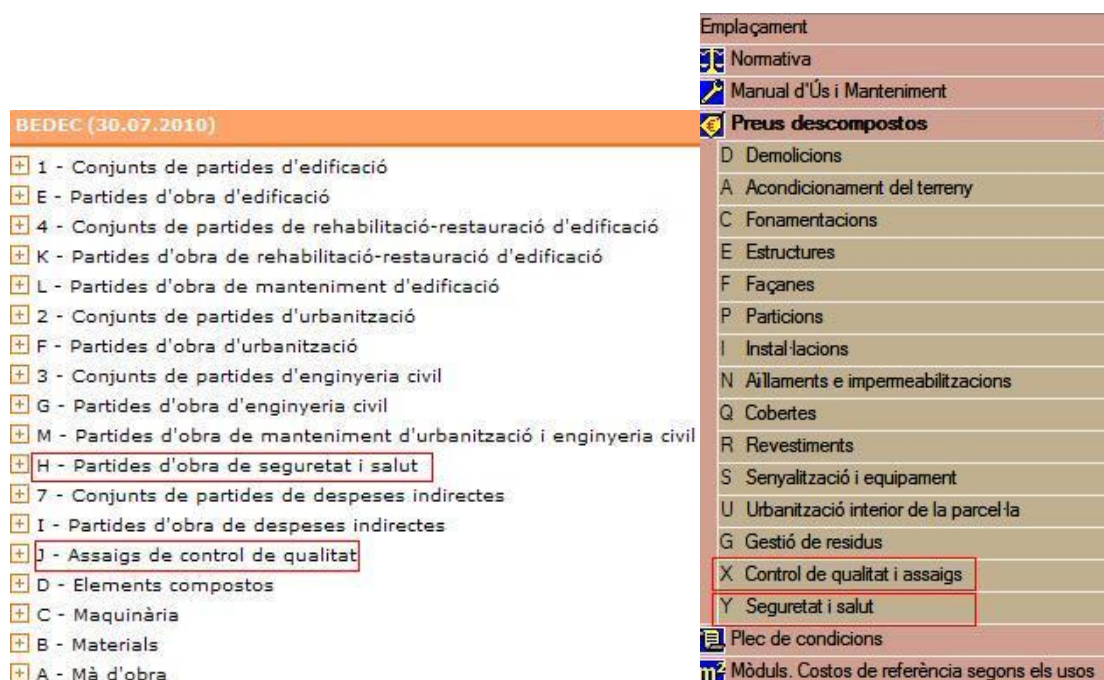


Figure 3.21: Screenshot of the “health and safety” and the “quality control tests” chapters at the BEDEC base and the Prices’ Generator

Comments

We can affirm that the BEDEC base makes a more divided structure at the level of chapters than the Prices’ Generator. In addition, both bases use different distributive criteria, which are:

- Including sub chapters at different chapters
- Considerate as chapters suits that the other base considers just simple sub chapters.

The Prices’ Generator applies these differences regarding the BEDEC base, and in the opposite direction. We have seen it previously.

The number of chapters of the BEDEC base look that this base is complex, in comparison to fewer chapters contained at the Prices’ Generator.

This, together with its more visually appealing design -especially for the choice of colours-, results in greater clarity and simplicity of CYPE’s program at this level.

The chapter “Ajudes del ram de paleta” (mason aids) includes activities that the Prices’ Generator does not contain.